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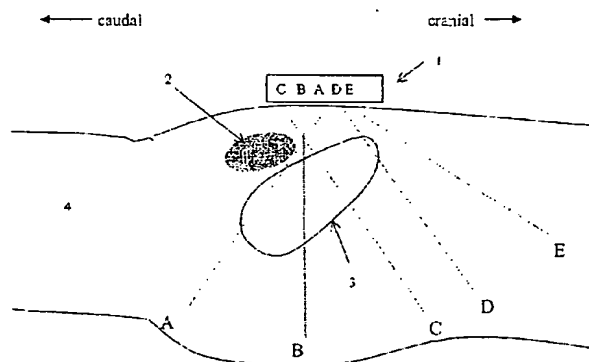
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(54) Title: **INSTANTANEOUS ULTRASONIC MEASUREMENT OF BLADDER VOLUME**



(57) Abstract: An apparatus and methods to quantify the volume of urine in a human bladder with a limited number of acoustic beams is disclosed. In a first version the apparatus is composed of a transducers assembly that transmits a plurality of narrow ultrasound beams in different directions towards the bladder and receives the returning ultrasound signals; a receiver detector for processing the returned signals; an analog-to-digital converter; a memory to store the digitized data and a volume display allowing to define the optimal position of the transducer assembly. The apparatus also includes a signal processing software that automatically determines the bladder Depth D and Height H and computes the volume of urine using an empirical formula corrected by specific, empirically measured, filling dependant correction factors. In a second version a single wide angle ultrasound beam transducer transmitting ultrasound signals at fundamental frequency is used to quantify the urine volume. Return signals originating from a depth beyond the usual position of the posterior wall depth of a filled bladder are analyzed for presence of higher harmonic signals which in turn are related to presence or absence of urine. Both methods or a combination thereof can be used as a simple warning device for presence of residual urine after voiding or indicate the presence of a critical bladder urine filling level.

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